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Application for Patent

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Group Art Unit 2143

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FOR:

SYNCHRONIZATION METHOD AND SYSTEM FOR KEEPING TRACK OF ENCODING HISTORY TO MAINTAIN DIGITAL SYSTEM SYNCHRONIZATION DURING COMMUNICATION OVER LOSSY TRANSMISSION MEDIA

SUBSTITUTE SUMMARY OF CLAIMED SUBJECT MATTER

SUMMARY OF CLAIMED SUBJECT MATTER (Substitute)

According to one aspect of the Applicant's invention as defined by independent claim 1, Applicant provides a method for transmitting encoded data between synchronized sending and receiving digital systems (Figure 1: systems 12 & 14) across a lossy transmission media (Figure 1: lossy media 16). The sending and receiving digital systems (12 and 14) maintain (Figures 2a and 2b: history and state memories 22 and 26) respective encoder and decoder information records (see page 4, lines 19, 20, 25 and 26; Figures 3a and 3b: records ROC. N-1; REC.N and REC.N+1). During the method, packet data to be transmitted by the sending digital system (12) is encoded (via Encoder 20 in Figure 2a) using encoding information in an encoder information record (Figure 3a: REC.N-1 or REC.N) that has been previously acknowledged by the receiving digital system (14). A new encoder information record including the encoding information used to encode the packet data as well as the packet data (Figure 3a: REC.N, and page 8, lines 15-20: "...The sending digital system 12 uses the Acking_Peer_Encoder_Hist_Tag tag of the packet header to update the history state information of the Encoder 20 so that record REC.N+1 becomes record REC.N") is built (step 118 in Figure 4). The encoded packet data is transmitted to the receiving digital system (14) as a packet including a header having a packet number (Pkt_Tag: page 5, line 14) and a tag identifying the encoding information used to encode the packet data (Acking_Peer_Encoder_Hist_Tag: page 5, line 15; and page 6, lines 8 to 10). When the packet is received by the receiving digital system (14), the header is examined (step 112 in Figure 4) to determine the encoding information used to encode the packet data (see page 6, lines 20 to 23). The packet is decoded using corresponding decoder information in the decoder information record (history/state information in memory 26) and the decoder information in the decoder information record is updated with the packet data (see page 6, lines 23 to 25 and step 112 in Figure 4). Processing of the packet is acknowledged to the sending digital system to enable the sending digital system to update the encoder information so that the new encoder information record is used to encode future packet data to be transmitted (see page 6, line 28 to page 7, line 2 and step 118 in Figure 4). When a packet is lost, the sending digital system rebuilds the new encoder information record without the lost packet data (see page 8, lines 21-77;

step 152 in Figure 6; and page 9, lines 7 to 16).

According to another aspect of the Applicant's invention as defined by independent claim 17, Applicant provides a communication system including synchronized sending and receiving digital systems (Figure 1: systems 12 & 14) transmitting encoded data across a lossy transmission medium (Figure 1, lossy media 16). The sending and receiving digital systems (12 and 14) maintain (Figures 2a and 2b: history and state memories 22 and 26) respective encoder and decoder information records (see page 4, lines 19, 20, 25 and 26; Figures 3a and 3b; records REC.N-1, REC.N and REC.N+1). The communication system comprises at the sending digital system (12) an encoder (20) for encoding packet data to be transmitted using encoding information in an encoder information record (Figure 3a; REC.N-1 or REC.N) that has been previously acknowledged by the receiving digital system (14). An encoder information record construct (operation of synchronization mechanism 18 of sending system 12 at step 118 of Figure 4) builds a new encoder information record including the encoding information used to encode the packet data as well as the packet data (Figure 3a: REC.N, and page 8, lines 15-20: "...The sending digital system 12 uses the Acking_Peer_Encoder_Hist_Tag tag of the packet header to update the history state information of the encoder 20 so that recorded REC.N+1 becomes record REC.N"). A transmitter (18) transmits the encoded packet data to the receiving digital system (14) as a packet including a header having a packet number (Pkt_Tag: page 5, line 14) and a tag identifying the encoding information used to encode the packet data (Acking_Peer_Encoder_Hist_Tag: page 5, line 15; and page 6, lines 8 to 10). At the receiving digital system, a header destruct (operation of mechanism 18 at step 12 in Figure 4) examines the header to determine the encoding information used to encode the packet data (see page 6, lines 20 to 23). A decoder (decoding operation of mechanism 18 in receiving system 14) decodes the packet using corresponding decoder information in the decoder information record (history/state information in memory 26) and updates the decoder information in the decoder information record with the packet data (see page 6, lines 23 to 25 and step 112 in Figure 4). An acknowledger (operation of mechanism 18 at step 118 in Figure 4) acknowledges processing of the packet to the sending digital system to enable the sending digital system to update the encoder information so that the new encoder information record is used to encode packet data (see page 6, line 28 to page 7, line 2). When a packet is lost, the encoder information record construct (operation of

mechanism 18 in sending system 12) is conditioned to rebuild the new encoder information record without the lost packet data (see page 8, lines 21-27; step 152 in Figure 6; and page 9, lines 7 to 16).

The present invention provides advantages in that if data packets are lost, the encoder of the sending digital system is conditioned to rebuild the unacknowledged encoder history/state information record without the missing packet data. Encoding can continue using the current or previously acknowledged encoder history/state information records. Thus, encoding history is used to the extent possibly even when packets are lost reducing the amount of vocabulary the encoding algorithm must relearn (see page 2, line 30 to page 3, line 4). When the sending and receiving digital systems become unsynchronized, the encoder history/state information is conditioned to the last known point at which the digital systems were known to be synchronized and not to its initial state as is common in prior art systems. This allows synchronization between the sending and receiving digital systems to be less tightly coupled. In this manner, encoding efficiency can be maintained since prior encoder history/state information is not lost. As a result, compressibility need not be reduced significantly when packet loss is detected and retransmission of lost data is required. This is particularly attractive when transmitting packetized data over unreliable networks such as the Internet and Frame Relay and IP networks (see page 9, lines 17 to 26).